

## 6.3 Standard Format for Transferring and Entering Unit and Daily Values

by James F. Cornwall

The standard format for transferring and entering Unit and Daily-Values consists of two parts: (1) an envelope for transferring Unit and Daily-Values in the recorded data format, and (2) a standard data format that is accepted by all of WRD's hydrologic databases. The envelope for transferring data consists of information that identifies the destination of the data and its format (i.e. whether it is in the standard data format or has not yet been converted). Collection of unconverted data is necessary since data are sometimes acquired by one computer and processed by another (e.g. data acquired by means of satellite telemetry). The standard data format consists of a sequence of records that contain all information needed to store Unit or Daily-Values for a WRD station. Both the transfer and data formats consist of different types of records that contain logically related information. Each record is identified by a record type field, which consists of the first two bytes (columns) of each record.

The following record types have been defined for the data envelope (transfer) format, and for the recorded data within the envelope:

### Record types defined for the transfer format:

Record Type	Content	Remarks
BE	<u>B</u> egin <u>E</u> nvelope	Begins Data Envelope and defines type of envelope.
VE	<u>V</u> ersion	Optional record used to indicate NWIS 4_x formatting.
DB	<u>D</u> ata <u>B</u> ase	Contains the database number to be used for storing data in this envelope.
DE	<u>D</u> estination	Defines destination of the data from this instrument as a list of DIS nodes (used primarily by DCPs).
MG	<u>M</u> essa <u>G</u> e	Contains a message to be sent to the user responsible for this station (used primarily by telemetry systems).
RE	<u>R</u> emark	Contains a remark to be archived with the data.
EE	<u>E</u> nd of <u>E</u> nvelope	End of data envelope
EF	<u>E</u> nd of <u>F</u> ile	Optional record used to indicate end of data, may be followed by messages or other information.

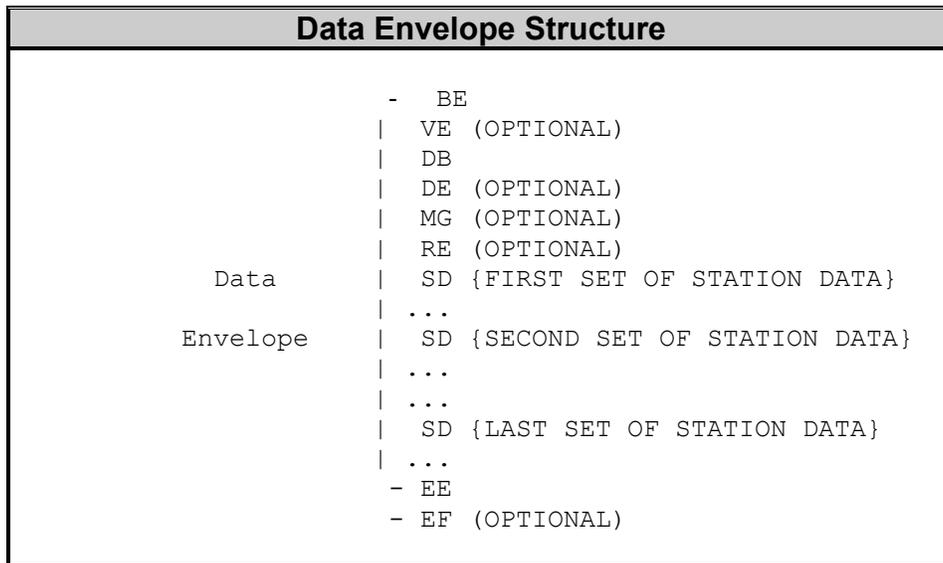
### Record types defined for the data format:

Record Type	Content	Remarks
SD	Station Data	Defines station at which instrument is located and any station-dependent information needed for decoding and storing data.
DI	<u>D</u> issemination	For DCP envelopes, contains transmission time and NESS DCP ID.
SE	<u>S</u> ensor Information	Defines sensor information.
TM	<u>T</u> ime Information	Defines starting date and time for fixed-interval data.
UF	Unit Values – Fixed Interval	Contains unit values stored at a fixed recording interval.

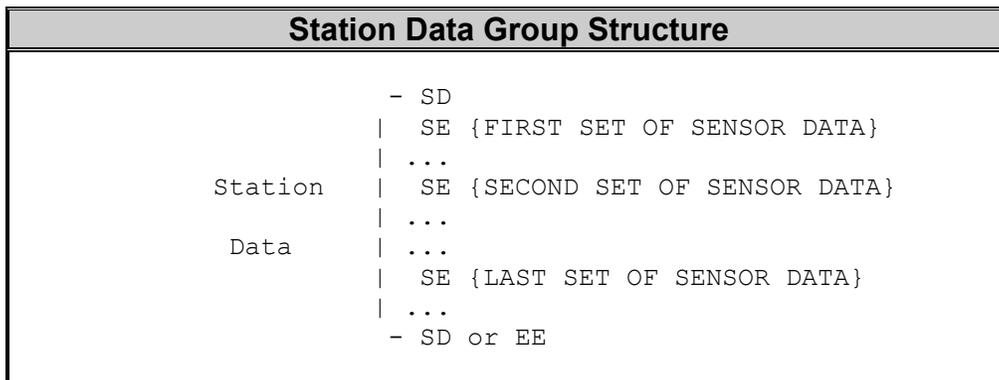
**Record types defined for the data format (continued):**

Record Type	Content	Remarks
UV	Unit Values – Variable Interval	Contains unit values stored at variable recording intervals.
UA	Unit Values -- Archive	Contains unit values retrieved from the unit-values file for archiving.
DF	Daily Fixed Time	Contains values stored daily at a fixed time.
DV	Daily Variable Time	Contains values stored daily but at variable times.
AL	ALert Signal	Signals that data from a sensor should receive alert processing (used primarily by telemetry systems).

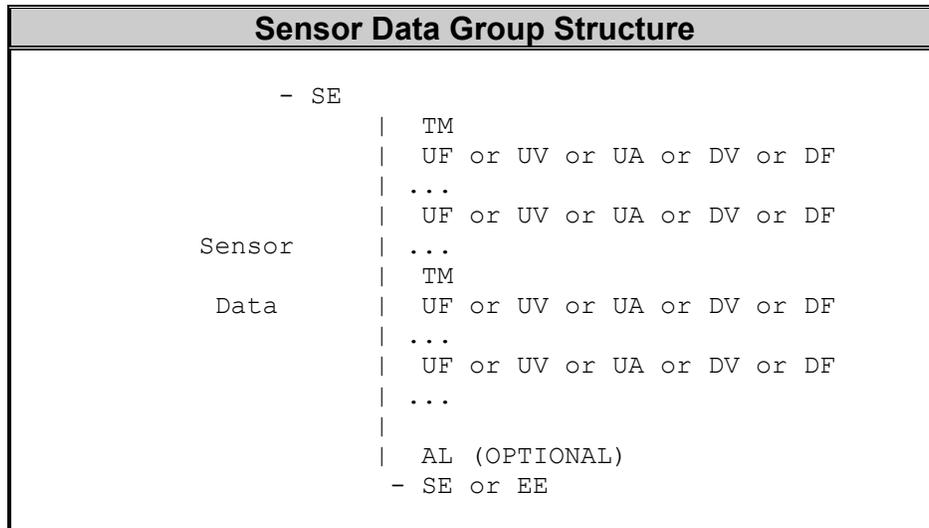
A data envelope begins with a BE record and ends with an EE record. An envelope contains information about the envelope (VE, DE, MG, RE, and DB records) and one or more groups of station data. A data envelope structure is shown in the following example:



A group of station data begins with an SD record and ends with either another SD record or the EE record. Each group of station data consists of one or more groups of sensor data. A station data group structure is shown in the following example:



A group of sensor data begins with an SE record and ends with either another SE record, an SD record, or an EE record. Each group of sensor data must have a TM record to define the date and/or time of that group of data. For fixed-interval data (UF and DF records), the TM record defines the date and time of the beginning time of the first data value on the next data record. Thus, any time there is a missing value, a new TM record must be included. For variable interval data (UV, UA, and DV records), the TM record defines the date of the data on the following data records. Thus, a TM record must appear whenever the date changes. A sensor data group structure is shown in the following example:



### RULES

1. Each envelope must contain data obtained from one recording instrument only.
2. Times for data readings are processed differently according to the presence or absence of a "VE 4" record.
  - (a) When the VE record is not present, all times will be considered as "local" times and will be converted to UTC according to the time zone code and daylight savings flag in the database for this station. **\*WARNING\*** - If daylight savings time is in effect for this station, times from 02:00:00 to 02:59:59 on a "spring-forward" day cannot be converted to UTC and will be discarded along with their corresponding values.
  - (b) When the VE record is present, the user (or software) creating the data must also provide the UTC offset in the TM records within the envelope. This UTC offset (in the format "+/- hh:mm") will be used to convert the supplied times to UTC for storage in the database.
3. An SD record must precede an SE record.
4. An SE record must precede a TM record.

5. If a VE record is present, there must be a UTC offset supplied for each TM record in the format specified in rule 2(b).
6. After an SE record has been encountered, the data records (UF, UV, UA, DF, or DV) must not change type before the next SE record is encountered (e.g. UV record must be followed by another UV record and not a UF, UA, DF, or DV record until the next SE record). The data record type may be changed after supplying a new SE record.
7. If telemetry data are to be processed by an alert routine, an AL (alert) record must follow the sensor data for which that AL record is associated.

Several examples of data envelope record streams are presented below.

<b>EDL Data, Fixed-Interval Unit Values</b>									
BE	STDEDL								
DB	7								
SD	USGS 02191500								
SE	1STAGE	65	11	72F010000					
TM	19861203010000								
UF	08	8.16	8.05	7.93	7.82	7.70	7.59	7.48	7.35
UF	08	7.03	6.94	6.85	6.76	6.70	6.64	6.58	6.53
UF	04	6.41	6.38	6.36	6.33				
SE	2DO	400	11	70F030000					
TM	19861203010000								
UF	24C	2176							
EE									

<b>EDL Data, Standard Formatting, Variable-Interval Unit Values</b>									
BE	STDEDL								
DB	1								
RE	This is an example with Local time (no UTC Offsets in TM rec)								
SD	USGS 06090800								
SE	7	000650001	64	V	M				
TM	20000331001500								
UV	4001500	12.37	003000	12.36	004500	12.35	010000	12.34	
UV	4011500	12.34	013000	12.33	014500	12.32	020000	12.32	
UV	4021500	12.31	023000	12.30	024500	12.29	030000	12.28	
UV	4224500	11.58	230000	11.58	231500	11.56	233000	11.56	
UV	4234500	11.55	240000	11.54					
TM	20000401001500								
UV	4001500	11.53	003000	11.52	004500	11.51	010000	11.50	
UV	4011500	11.49	013000	11.48	014500	11.47	020000	11.46	
UV	4021500	11.46	023000	11.45	024500	11.44	030000	11.43	
EE									

**EDL Data, Version 4 Formatting, Variable-Interval Unit Values**

```
BE STDEDL
VE 4
DB 1
RE This is an example with UTC offset supplied for the station
SD USGS 06090800
SE 7 000650001 64 V M
TM 20000331001500 -07:00
UV 4001500 12.37 003000 12.36 004500 12.35 010000 12.34
UV 4011500 12.34 013000 12.33 014500 12.32 020000 12.32
UV 2234500 11.55 240000 11.54
TM 20000401001500 -07:00
UV 4001500 11.53 003000 11.52 004500 11.51 010000 11.50
UV 4011500 11.49 013000 11.48 014500 11.47 020000 11.46
UV 4021500 11.46 023000 11.45 024500 11.44 030000 11.43
EE
```

### 6.3.1 Record Types for the Transmission Envelope

<b>Record Type BE: Beginning of Envelope</b>		
Columns	Length	Description
1 - 2	2	Record Type = BE
3	1	BLANK
4 - 6	3	Type of Message:  SCF - Site configuration information DCF - Device configuration information STD - Message in standard format RAW - Raw data along with conversion information EU - DRGS engineering units format DCP - Unconverted DCP message
7 - 9	3	Data Source Type:  ADR - 16-channel paper tape recorder ARC - Unit values archived from ADAPS CHA - Stripchart DCP - Data collection platform EDL - Electronic data logger OBS - Observer RAD - Radio telemetry TEL - Dial-up telephone telemetry UNS - Unspecified (valid for transferred data & B-card data processed using UV_STORE)

<b>Record Type VE: Version Number (optional)</b>		
Columns	Length	Description
1 - 2	2	Record Type = VE
3	1	BLANK
4	1	"4"

<b>Record Type DB: Database Number (Must be supplied for DCP data; otherwise optional.)</b>		
Columns	Length	Description
1 - 2	2	Record Type = DB
3	1	BLANK
4 - 5	2	Database Number used by ADAPS for database identification.

<b>Record Type DE: Destination</b>		
<b>Columns</b>	<b>Length</b>	<b>Description</b>
-----		
1 - 2	2	Record Type = DE
3	1	BLANK
4 - 39	36	Destination nodes; up to six 6-character nodes used to distribute data in this envelope.

<b>Record Type MG: Message</b>		
<b>Columns</b>	<b>Length</b>	<b>Description</b>
-----		
1 - 2	2	Record Type = MG
3	1	BLANK
4 - 80	77	Message to be sent to operational contact (used in telemetry systems to report problems or system status)

<b>Record Type RE: Remark</b>		
<b>Columns</b>	<b>Length</b>	<b>Description</b>
-----		
1 - 2	2	Record Type = RE
3	1	BLANK
4 - 80	77	Remarks about the data that should be archived with the data

<b>Record Type: EE End of envelope</b>		
<b>Columns</b>	<b>Length</b>	<b>Description</b>
-----		
1 - 2	2	Record Type = EE

<b>Record Type: EF End of File</b>		
<b>Columns</b>	<b>Length</b>	<b>Description</b>
-----		
1 - 2	2	Record Type = EF Anything following this record is ignored. May be used for informational or error messages.

### 6.3.2 Record Types for the Data Records

#### Record Type AL: Alert - Identifies data to be processed for alert conditions

Columns	Length	Description
1 - 2	2	Record Type = AL
3	1	BLANK
4 - 5	2	Alert number - identifies ADAPS alert routine to invoke.
6 - 37	32	User ID - user-identifier to notify when an alert condition is detected.

#### Record Type SD: Station Data

Columns	Length	Description
1 - 2	2	Record Type = SD
3	3	BLANK
4 - 8	5	Agency
9 - 23	15	Station number
24 - 26	3	UTC offset used
27 - 27	1	Daylight savings flag

`Y' - recording times have been converted to daylight savings time for this station.

#### Record Type DI: Dissemination (optional - DCP envelopes only)

Columns	Length	Description
1 - 2	2	Record Type = DI
3	1	BLANK
4 - 17	14	UTC Date/time of the DCP transmission in the format YYYYMMDDHHMMSS, where: YYYY - Year MM - Month DD - Day HH - Hour MM - Minutes SS - Seconds
18	1	BLANK
19 - 26	8	NESS DCP id

<b>Record Type SE: Sensor</b>		
Columns	Length	Description
1 - 2	2	Record Type = SE
3	1	BLANK
4 - 7	4	Data Descriptor Number (right-justified) Connects this sensor with a data descriptor record in ADAPS.
8 - 15	8	Sensor Name (blank if coming from UV_ARCHIVE)
16 - 20	5	Parameter code
21 - 25	5	Statistic code
26 - 27	2	Length of data field
28 - 28	1	Precision of data (blank if coming from UV_ARCHIVE)
29	1	Recording mode: F - Fixed interval recording V - Variable interval recording
30 - 35	6	Recording interval of this sensor (used when RMODE = 'F') in the format HHMMSS where: HH - Hours (Range: 0-24) MM - Minutes (Range: 0-59) SS - Seconds (Range: 0-59) (At least one of these field must be greater than zero.) Blank if coming from UV_ARCHIVE.
37	1	Unit-values type code ('M'=measured, 'E'=edited, 'R'=data corrections, 'S'=shifts, and 'C'=computed)
38	1	Transport type code (used if coming from UV_ARCHIVE) ('U'=Unspecified historical data, 'A'=ADR, 'E'=EDL, and 'S'=DCP (Satellite data).
39 - 50	12	Sensor_type_id (right-justified integer, always 0 for NWIS 4_2)

<b>Record Type UF: Unit Values - Fixed Interval</b>		
Columns	Length	Description
1 - 2	2	Record Type = UF
3	1	BLANK
4 - 6	3	Number of unit values in this record. For uncompressed data, must be less than or equal to 124/field length. For compressed data, must be less than 1000.
7	1	Compression flag 'C' indicates that this record contains one value that represents the number of values specified in columns 4-7.
8 - 132	125	Unit values (with length of each value determined by the length specified in sensor record)

<b>Record Type TM: Date-Time Record</b>		
Columns	Length	Description
1 - 2	2	Record Type = TM
3	1	BLANK
4 - 11	8	Date of first value in the format YYYYMMDD where YYYY - Year MM - Month DD - Day
12 - 17	6	Time of first recording in the format HHMMSS where: HH - Hour MM - Minute SS - Second
18	1	Unit-Values data aging code, used only if coming from UV_ARCHIVE ('W'=Working, 'R'=in-Review, and 'A'=Approved records).
19 - 24	6	UTC offset for station in the format +/-HH:MM (e.g. "-07:00") where: HH - Hours MM - Minutes

<b>Record Type UA: Unit Values - Variable Interval (Archive)</b>		
Columns	Length	Description
1 - 2	2	Record Type = UA
3	1	BLANK
4 - 6	3	Number of unit values in this record
7 - 132	126	Unit Values repeated the number of times specified in columns 4-6 in the format HHMMSSD DDD...DXYZZZ...ZB where: HH - Hour value was recorded. MM - Minute value was recorded. SS - Second value was recorded. DDDD...D - Unit value whose length is specified in the associated SE record. X - Write protect code Y - Rounding code ZZZ...Z - UV source and screen codes B - Blank space indicating end of codes.

Record Type UV: Unit Values - Variable Interval		
Columns	Length	Description
1 - 2	2	Record Type = UV
3	1	BLANK
4 - 6	3	Number of unit values in this record
7 - 132	126	Unit Values repeated the number of times specified in columns 4-6 in the format HHMMSSDDDD...D where: HH - Hour value was recorded. MM - Minute value was recorded. SS - Second value was recorded. DDDD...D - Unit value whose length is specified in the associated SE record.

Record Type DF: Daily Values - Fixed Interval		
Columns	Length	Description
1 - 2	2	Record Type = DF
3	1	BLANK
4 - 6	3	Number of daily values in the record. For uncompressed data, must be less than or equal to 124/column length. For compressed data, must be less than 1000.
7	1	Compression flag 'C' indicates that this record contains 1 value that represents the number of values specified in columns 4-6.
8 - 132	125	Daily values with length of each value determined by the length specified in sensor record.

Record Type DV: Daily Values - Variable Interval		
Columns	Length	Description
1 - 2	2	Record Type = DV
3	1	BLANK
4 - 6	3	Number of daily values in this record
7 - 132	126	Daily Values repeated the number of times specified in columns 4-6 in the format YYYYMMDDHHMMSSDDDD...D where: YYYY - Year value was recorded. MM - Minute value was recorded. DD - Day value was recorded. HH - Hour value was recorded. MM - Minute value was recorded. SS - Second value was recorded. DDDD...D - Daily value whose length is specified in the associated SE record.